

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-208740

(43)Date of publication of application : 12.08.1997

(51)Int.Cl.

C08K 3/22

C01F 7/02

C09C 1/40

(21)Application number : 08-015227

(71)Applicant : SUMITOMO CHEM CO LTD

(22)Date of filing : 31.01.1996

(72)Inventor : ARAHA SATOSHI  
MIZOE TOSHIYUKI

## (54) ALUMINUM HYDROXIDE FOR RESIN FILLER AND PRODUCTION THEREOF

## (57)Abstract:

PROBLEM TO BE SOLVED: To obtain an aluminum hydroxide able to provide a resin composition when filling to a thermoplastic resin, manifesting excellent flame retardance free from derogation of excellent surface properties and mechanical strength without using other auxiliary flame retardant by grinding a specific aluminum hydroxide.

SOLUTION: This aluminum hydroxide contains less than 0.3wt.% of Na expressed in terms of Na<sub>2</sub>O, average secondary particle size  $\leq 10\mu\text{m}$  and manifests melt-flow rate of 0.55/10min when filling 150 pts.wt. of this aluminum hydroxide to 100 pts.wt. of a thermoplastic resin having melt-flow rate of 0.8/10min. This aluminum compound is obtained by grinding the ungrounded aluminum compound obtained by Bayer's process containing less than 0.3wt.% of Na expressed in terms of Na<sub>2</sub>O, average primary particle size 0.5–60 $\mu\text{m}$ , average secondary particle size 0.5–60 $\mu\text{m}$ , is grounded with a volume grinding machine to the extent that the average secondary particle size is decreased to 10–90%, then the surface is crashed by trituration, etc.

## LEGAL STATUS

[Date of request for examination] 18.12.2002

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3616861

[Date of registration] 19.11.2004

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

BEST AVAILABLE COPY

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

---

CLAIMS

---

[Claim(s)]

[Claim 1] the resin restoration whose content Na concentration is characterized by the melt flow rates of the resin constituent after this resin restoration being 0.55g / 10 minutes or more in Na<sub>2</sub>O conversion when it is 0.3 or less % of the weight, and the second [ an average of ] particle diameter is 10 micrometers or less and 150 weight sections restoration is carried out to the thermoplastics 100 weight section whose melt flow rates are 0.80g / 10 minutes -- service water -- an aluminum oxide.

[Claim 2] The first [ an average of ] particle diameter 0.3 or less % of the weight by Na<sub>2</sub>O conversion 0.5 micrometers - 15 micrometers, [ content Na concentration ] The aluminum hydroxide which is not ground [ which was obtained with the Bayer process whose second / an average of / particle diameter is 0.5 micrometers - 60 micrometers ] It grinds using a bulk crushing machine until this second [ an average of ] particle diameter becomes the range which is 10% - 90%. Perform surface grinding according the aluminum hydroxide after grinding to grinding further, and in subsequently, the range whose second [ an average of ] particle diameter after grinding is 60% - 99% of the second [ an average of ] particle diameter in front of surface grinding and the resin restoration which has the physical properties according to claim 1 characterized by grinding so that it may be 1.2 to 5 times the BET specific surface area before the BET specific surface area after grinding grinding -- service water -- the manufacture approach of an aluminum oxide.

[Claim 3] After grinding the aluminum hydroxide whose second [ an average of ] particle diameter is 0.5 micrometers - 30 micrometers until the second [ an average of ] particle diameter after grinding becomes the range which is 10% - 90% using a dry type impact grinder, The alkali concentration in equilibrium adds and slurs the aluminum hydroxide after this grinding by Na<sub>2</sub>O conversion at 20 degrees C - 80 degrees C in the ulmin acid alkali solution which is 1 mol/l - 10 mol/l. Subsequently, by carrying out 10 degrees C - 70 degree-C temperature up of this slurry the resin restoration which has the physical properties according to claim 1 characterized by making the BET specific surface area of the aluminum hydroxide after adding in an ulmin acid alkali solution fall to this solution 70 to 95% rather than addition before -- service water -- the manufacture approach of an aluminum oxide.

---

[Translation done.]

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention] the resin restoration whose this invention gives fire retardancy to interior material, an electron, housing of an electrical machinery and apparatus, and other resin Plastic solids -- service water -- it is related with an aluminum oxide and its manufacture approach. the front face in which the Plastic solid which the handling at the time of processing is easy, and is acquired was furthermore excellent while making sufficient fire retardancy for the resin Plastic solid filled up with this aluminum hydroxide give a detail -- the resin restoration which presents description -- service water -- it is related with an aluminum oxide and its manufacture approach.

[0002]

[Description of the Prior Art] In recent years, by remarkable advance of petrochemistry and organic polymer chemistry, in our life space, polymeric materials serve as various necessities and exist. For example, as for thermoplastics, such as polyethylene, polypropylene, and a vinyl chloride, the cladding material of interior material, such as a carpet in an automobile or a house and lining, TV, another personal computer and electrical-and-electric-equipment product, and an electric wire etc. is used widely. However, since these polymeric materials have the property which emits an elevated temperature and burns like common knowledge, also when a lot of [ when a fire once breaks out / not only force-of-fire expansion but ] smoke, toxic gases, corrosive gas, etc. occur, more excellent flameproofing and nonflammable-ization are demanded from a viewpoint on safety and disaster prevention from a certain thing.

[0003] Although many cures of flameproofing have been taken against the polymeric materials used for this application from this point, the trend of the latest fire-resistant regulation is not only the ingredient which cannot burn easily, but to be hard to generate a toxic gas, a thing [ low fuming ], etc. are demanded.

[0004] For this reason, although halogen series flame retardants, such as Br system and Cl system, have been conventionally developed by the subject to flameproofing of polymeric materials, this halogen series flame retardant is gradually \*\*\* (ed) from the field of fuming and toxic gas generating, and development of inorganic flame retardants, such as a metal hydroxide which is low venenosity as what is replaced with this, and has an emitting smoke control function, tin oxide, antimony oxide, way acid chloride, and phosphorus compounds, etc. is performed briskly.

[0005] Especially, an aluminum hydroxide demonstrates fire-resistant effectiveness from both sides of the endothermic reaction accompanying heating, and dehydration, and does not have generating of a toxic gas, either, and is a flame retarder with high safety. the dehydration product of an aluminum hydroxide also has emitting smoke depressor effect with high specific surface area, and is chemically [ at a low price and ] more stable still as compared with other metal hydroxides -- etc. -- having many advantages gets to know -- having -- carrying out -- \*\*. However, in order to give sufficient fire retardancy for resin, it is necessary to add so much, and in carrying out restoration mixing of the aluminum hydroxide of extent which gives desired fire retardancy, it has a fault, such as spoiling the fabrication nature which was excellent in resin

original.

[0006] The technique of performing surface treatment to an inorganic bulking agent is already well-known as a means to secure fire retardancy, without spoiling the fabrication nature which was excellent in resin original. For example, the approach of filling up with a silane coupling agent into EVA the inorganic hydrate which carried out surface treatment is indicated by JP,61-264034,A.

[0007] However, although the fire retardancy of a Plastic solid and the mechanical strength which are obtained from this resin constituent have improved by the above-mentioned approach, the fluidity of the resin constituent under heating was inadequate, fabrication nature was bad, addition drugs, such as resin and a finishing agent, deteriorated by generation of heat produced at the kneading process which requires high torque, and there was a problem of a Plastic solid coloring.

[0008] On the other hand, the technique of decreasing the fill of a metal hydroxide by adding a fire-resistant assistant, and aiming at improvement in a mechanical strength is also known. For example, in the approach of blending with ethylene propylene rubber or ethylene butene-1 rubber the particle aluminum hydroxide which performed surface treatment with the fatty acid or the fatty-acid metal salt, and red phosphorus at JP,62-218432,A, and JP,61-130370,A, it is Mg (OH) 2 to the polyolefine 100 weight section. Or aluminum3 (OH) The approach of carrying out 3-50 weight section restoration of any they are among the 50 - 100 weight section, \*\*\*\*\*, zinc borate, and a titanium dioxide etc. is indicated.

[0009] However, when the Lynn system compounds, such as \*\*\*\*\*, are used for a fire-resistant assistant like the above, at the time of a combination activity, work environment stricter than dust is generated and a worker's health may be injured is required, and in order to attain this, it has a fault, such as causing increase of manufacturing facility expense.

[0010]

[Problem(s) to be Solved by the Invention] the front face in which the Plastic solid which shows the fire retardancy excellent in the Plastic solid acquired with this resin constituent even if it does not add other fire-resistant assistants at all other than an aluminum hydroxide, and is excellent in the handling nature at the time of fabrication when the purpose of this invention fills up resin, especially thermoplastics with an aluminum hydroxide and it is used as a resin constituent, and which is acquired using this resin constituent is [ both ] excellent -- the resin restoration which presents description -- service water -- an aluminum oxide and its manufacture approach offer.

[0011] the resin restoration with which this invention persons are satisfied of the above-mentioned purpose in view of the bottom of this situation -- service water, as a result of inquiring wholeheartedly in order to find out an aluminum oxide When it has the second [ an average of ] particle diameter and Na concentration below the specific range and specific resin is filled up, the aluminum hydroxide which shows a specific fluidity may satisfy all the above-mentioned purposes, Moreover, this aluminum hydroxide finds out being obtained using the aluminum hydroxide which has specific physical properties as a raw material by giving this two or more kinds combining specific actuation of grinding, the partial dissolution, etc., and came to complete this invention.

[0012]

[Means for Solving the Problem] namely, the resin restoration characterized by MFRs of the resin constituent after this resin restoration being 0.55g / 10 minutes or more when 0.3 or less % of the weight and the second [ an average of ] particle diameter are 10 micrometers or less in Na2 O conversion and content Na concentration carries out 150 weight sections restoration of this invention to the thermoplastics 100 weight section whose melt flow rates (it may outline Following MFR) are 0.80g / 10 minutes -- service water -- it is in offering an aluminum oxide.

[0013] Furthermore, content Na concentration this invention by Na2 O conversion 0.3 or less % of the weight, The aluminum hydroxide which is not ground [ which was obtained with the Bayer process whose first / an average of / particle diameter is 0.5 micrometers - 15 micrometers, and whose second / an average of / particle diameter is 0.5 micrometers - 60 micrometers ] It grinds using a bulk crushing machine until this second [ an average of ] particle diameter

becomes the range which is 10% - 90%. Perform surface grinding according to the aluminum hydroxide after grinding to grinding further, and in subsequently, the range whose second [ an average of ] particle diameter after grinding is 60% - 99% of the second [ an average of ] particle diameter in front of surface grinding. And by grinding so that it may be 1.2 to 5 times the BET specific surface area before the BET specific surface area after grinding. In Na<sub>2</sub>O conversion, content Na concentration is 0.3 or less % of the weight, and the second [ an average of ] particle diameter is 10 micrometers or less. the resin restoration whose MFRs of this restoration constituent are 0.55g / 10 minutes or more when MFR carries out 150 weight sections restoration to the thermoplastics 100 weight section which are 0.80g / 10 minutes -- service water -- it is in offering the manufacture approach of an aluminum oxide.

[0014] After this invention furthermore grinds the aluminum hydroxide whose second [ an average of ] particle diameter is 0.5 micrometers - 30 micrometers until it becomes the range whose second [ an average of ] particle diameter after grinding is 10% - 90% using a dry type impact grinder. The alkali concentration in equilibrium adds and slurs the aluminum hydroxide after this grinding by Na<sub>2</sub>O conversion at 20 degrees C - 80 degrees C in the ulmin acid alkali solution which is 1 mol/l - 10 mol/l. Subsequently, by making it fall 70 to 95% rather than BET specific surface area of aluminum hydroxide after adding in ulmin acid alkali solution addition-in this solution-before by carrying out 10 degrees C - 70 degree-C temperature up of this slurry. In Na<sub>2</sub>O conversion, content Na concentration is 0.3 or less % of the weight, and the second [ an average of ] particle diameter is 10 micrometers or less. the resin restoration whose MFRs of this restoration constituent are 0.55g / 10 minutes or more when MFR carries out 150 weight sections restoration to the thermoplastics 100 weight section which are 0.80g / 10 minutes -- service water -- it is in offering the manufacture approach of an aluminum oxide.

[0015]

[Embodiment of the Invention] Hereafter, this invention is further explained to a detail. The outstanding handling property at the time of the fabrication of a resin constituent in which this invention carried out aluminum-hydroxide restoration from many experiments, the front face which was excellent while the Plastic solid which processed this resin constituent and was acquired discovered sufficient fire-resistant effectiveness, in order to attain the purpose that description is discovered. When it has Na concentration below the second [ an average of ] specific particle diameter and the amount of specification and specific resin is filled up, That it must be the aluminum hydroxide which shows the fluidity more than specification, and the aluminum hydroxide which has these physical properties. It finds out being obtained using the aluminum hydroxide which has specific physical properties as a raw material by giving this two or more kinds combining specific actuation of grinding, the partial dissolution, etc., and completes.

[0016] The second [ an average of ] particle diameter of the aluminum hydroxide for resin restoration of this invention has indispensable about 10 micrometers or less, and is about 0.1 micrometers - about 5 micrometers more preferably about 0.1 micrometers - about 10 micrometers. When the second [ an average of ] particle diameter of an aluminum hydroxide exceeds about 10 micrometers, the mechanical strength fall of the Plastic solid acquired from this resin constituent and a particle appear in a Plastic solid front face, and cause a poor appearance. Moreover, when it is a particle, a maldistribution is produced, and it may cause a mechanical-strength fall and poor appearance of a Plastic solid similarly.

[0017] moreover, resin restoration of this invention -- service water -- as an aluminum oxide -- content Na concentration -- Na<sub>2</sub>O conversion -- about 0.3 or less % of the weight -- desirable -- about 0.01- about 0.2 % of the weight -- more -- desirable -- about 0.01- about 0.15% of the weight of a thing is used. When this content Na concentration exceeds about 0.3 % of the weight, since thermal resistance falls, a pyrolysis is occurred at the time of processing of a resin constituent and fire retardancy falls, it is not desirable.

[0018] Furthermore, as for the aluminum hydroxide used in this invention, it is indispensable that MFRs of the resin constituent with which MFR carried out 150 weight sections restoration of this aluminum hydroxide to the thermoplastics 100 weight section which are about 0.80g / 10 minutes are about 0.55g / 10 minutes or more. the front face of the Plastic solid which the fabrication nature of this resin constituent gets worse when MFRs of this resin constituent are

about 0.55g / less than 10 minutes, and is acquired -- description -- a mechanical strength fall. Although the thermoplastics used for measurement of MFR was not especially restricted when MFR was thermoplastics which is about 0.80g / 10 minutes, in this invention, super-low density polyethylene (the Sumitomo Chemical [ Co., Ltd. ] make, a brand name: EKUSEREN VL and VL100) was used for it.

[0019] To the thermoplastics 100 weight sections, such as a polymer of styrene, such as well-known resin, for example, polyethylene, an ethylene propylene copolymer, ethylene and a vinyl acetate copolymer, an ethylene butene copolymer, an ethylene acrylate copolymer, polypropylene, polystyrene, and ABS, AAS, AES, or a copolymer, and a methacrylic-acid polymer, about 150 to about 400 weight section restoration of the aluminum hydroxide with which are satisfied of all these physical properties can be carried out further, and it can usually be ordinarily applied to an application large as a flame-retardant-resin constituent more than the about 100 weight section more than the about 50 weight section

[0020] On the occasion of this aluminum-hydroxide use, surface treatment may be performed if needed. Although especially the drugs that perform surface treatment are not limited, generally the metal salt is used for fatty acids, such as stearin acid and oleic acid, and a list at copolymers, such as various coupling agents, such as fatty acid ester, such as a fatty-acid metal salt and butyl stearate, a silane coupling agent, a titanate coupling agent, and an aluminates coupling agent, and a maleic acid, an olefin, and an alkyl phosphoric ester list. The metal salt is desirable in an alkyl phosphoric ester list especially.

[0021] Although the manufacture approach of the aluminum hydroxide of this invention is not limited especially if it is an approach by which what has the above-mentioned physical properties is obtained, it can be acquired, for example by the following approaches. The first [ an average of ] particle diameter which is not ground [ which was first obtained with the Bayer process as the 1 manufacture approach ] as a raw material aluminum hydroxide About 0.5 micrometers -- about 15 micrometers, About 0.5 micrometers -- about 10 micrometers of about 0.5 micrometers -- about 60 micrometers of about 1 micrometer -- about 30 micrometers of about 0.5 micrometers -- about 5 micrometers and the second [ an average of ] particle diameter are about 1 micrometer -- about 10 micrometers preferably. Content Na concentration preferably about 0.3 or less % of the weight by Na<sub>2</sub> O conversion About 0.01 -- 0.2 % of the weight of abbreviation, More preferably, using the aluminum hydroxide of about 0.01 -- 0.15 % of the weight of abbreviation, using a bulk crushing machine, the second [ an average of ] particle diameter of this raw material aluminum hydroxide grinds this about 10 -- 90% of abbreviation, until it becomes about 15 -- 85% of abbreviation preferably. The aluminum hydroxide obtained by the Bayer process as the above-mentioned raw material aluminum hydroxide is mentioned. Moreover, a bulk crushing machine points out an impact grinder which is usually looked at by 1283rd page -- edition [ of chemical engineering handbook revision / 4th ] No. 1292, a ball mill, a vibration ball mill, a special ball mill, a jet pulverizer, etc., and jet pulverizers, such as special ball mills, such as impact type pulverizers, such as a super micron mill, contra PUREKKUSU, and a pulverizer, a planet form grinder, an apex mill, a high-speed-steel wing ball mill, and a tower mill, a jet mizer, and a jet mill, etc. are mentioned as a commercial item. grinding according [ the aluminum hydroxide after grinding ] to the grinding approach further with a bulk crushing machine -- carrying out -- about 60% -- about 99% of the second [ an average of ] particle diameter before the second [ an average of ] particle diameter after grinding grinding (after wet medium mill grinding) -- desirable -- about 65% -- about 99% of range -- it is -- and about 1.2- of the BET specific surface area before the BET specific surface area after grinding grinding -- about 5 times -- desirable -- about 1.2- it grinds so that it may increase about 3.5 times.

[0022] In the above-mentioned manufacture approach, when the first [ an average of ] particle diameter of the raw material the non-ground aluminum hydroxide with which bulk crushing is presented is less than about 0.5 micrometers, a desired fluidity is not acquired, but when larger than about 15 micrometers of another side, at the time of grinding, a strain goes into a primary particle and thermal resistance falls. Moreover, when the second [ an average of ] particle diameter is less than about 0.5 micrometers, the particle the efficiency of comminution indicates a desired fluidity to be bad is difficult to get, and since great energy is needed in order that the

second [ an average of ] particle diameter may obtain particle about 10 micrometers or less in the case of a large particle which exceeds about 60 micrometers, it is not desirable.

[0023] In this approach, when the grinding effectiveness in a bulk crushing machine appears in broadcloth-ization of particle size distribution and optimal grinding is performed, the fine particles which have the particle size distribution in which high density restoration is possible are obtained. When it is less than 10% of a particle before the second [ an average of ] particle diameter of the aluminum hydroxide after grinding in a bulk crushing machine, it becomes overgrinding and the thermal resistance of a grinding article falls. On the other hand, when the particle size after grinding is larger than 90%, probably because the particle size distribution which enable minute restoration are not acquired, the fill to the inside of resin falls. Moreover, as a device used for grinding, a \*\*\*\* machine, a decanter, etc. are usually mentioned. The fluidity at the time of specific surface area increasing to less than 60% of case as compared with the second [ an average of ] particle diameter before grinding, and extent of grinding by grinding filling up resin not only gets worse, but thermal resistance falls. moreover, the fill to the inside of resin when the particle size after grinding exceeds 99%, probably because the particle size distribution which enable minute restoration are not acquired -- falling -- the front face of a Plastic solid -- the resin restoration to which it can be satisfied with of description and desired fire-resistant effectiveness can be made to give -- service water -- an aluminum oxide is not obtained.

[0024] As the second manufacture approach, the second [ an average of ] particle diameter About 0.5 micrometers - about 30 micrometers, A dry type impact grinder is preferably used for about 1 micrometer - about 10 micrometers aluminum hydroxide. The second [ an average of ] particle diameter after grinding About 10% - about 90%, After grinding until it becomes about 15% - about 85% of range preferably, the alkali concentration in equilibrium adds and slurs the aluminum hydroxide after this grinding by Na<sub>2</sub>O conversion at about 20 degrees C - about 80 degrees C in the ulmin acid alkali solution which are about 1 mol/l - about 10 mol/l.

Subsequently, by carrying out about 10 degrees C - about 70 degree-C temperature up processing (however, below the boiling point) of this slurry Rather than addition-in this solution before, about 70 - 95% of abbreviation, the BET specific surface area of the aluminum hydroxide after adding in an ulmin acid alkali solution is made to be able to fall abbreviation 80-about 90% preferably, and can be manufactured. As a dry type impact grinder, a jet mill grinder is common, and a counter jet mill, a supersonic jet mill, etc. are used as a commercial item.

[0025] The aluminum hydroxide for resin restoration of this invention can be obtained by the above-mentioned approach. Moreover, although it does in this way, is obtained and especially the approach of the drugs processing to an aluminum-hydroxide front face is not limited, either For example, drugs are added to the aluminum hydroxide which is in a suspension condition in a dispersion medium. The approach of drying, after fully carrying out mixed churning, and after making water, an organic solvent, etc. dissolve or homogeneity distribute drugs beforehand, How to mix and dry using a Henschel mixer, Woerner, a ribbon blender, etc. with an aluminum hydroxide, The approach of using blenders, such as a super mixer, for the dry aluminum hydroxide, and carrying out dry type processing of the drugs or an aluminum hydroxide is ground, drugs are added at the time of grain-size preparation, and the approach of applying and carrying out surface treatment of MEKANOKEMIKARU etc. is taken.

[0026]

[Effect of the Invention] resin restoration of this invention explained in full detail above -- service water -- an aluminum oxide When filling up resin, especially thermoplastics and using it as a resin constituent, The Plastic solid acquired even if it did not add other fire-resistant assistants at all other than the aluminum hydroxide of this invention the outstanding front face - description -- it can be filled up with the aluminum hydroxide of the amount which discovers the outstanding fire retardancy, without spoiling a mechanical strength in a list -- possible \*\* -- it is -- it is \*\* and the value on the industry including safety, workability, or a price being cheap etc. is size very much.

[0027]

[Example] Hereafter, although an example explains this invention further, thereby, this invention

is not limited. In addition, this invention, the physical properties of resin restoration constituent were measured by the following technique, and the evaluation result of an example and the example of a comparison was summarized in Table 1.

[0028] Fluidity: Based on JIS-K7210, it measured on the measurement temperature of 190 degrees C, and the conditions of 2.16kg of loads. Measuring equipment used the melt indexer (the product made from treasure industry, form: L207).

[0029] First [ an average of ] particle diameter: It measured with the micro truck MKII particle-size-distribution meter (the SPA model 7997-20, Nikkiso Co., Ltd. make).

Second [ an average of ] particle diameter: The maximum particle diameter of the fixed direction was measured about 30 particles which carried out random sampling using the scanning electron microscope photograph, and it asked from the average.

Kneading torque measuring method: The torque value in front of the kneading termination which appeared on the chart was read at the time of resin restoration constituent kneading with a lab PURASUTO mill.

a front face -- description: -- it observed visually. O The surface smooth nature fitness of a Plastic solid and x show surface poor smoothness.

[0030] Fire retardancy: The test piece of 30x25mmx0.3mm was fired by the burner from the lower limit, when fire stuck, the burner was immediately removed from the test piece lower limit, and time amount until these all test pieces burn was measured.

[0031] (The aluminum-hydroxide preparation approach)

The sodium aluminate solution held at 160 degrees C of examples (soda concentration 130 g/l by Na<sub>2</sub>O conversion) Na<sub>2</sub>O/aluminum 2O<sub>3</sub> Stirring to a mole ratio 1.6 by carrying out 65 g/l addition of the seed aluminum hydroxide with a particle diameter [ second / an average of ] of 2 micrometers By adding gradually this presentation sodium aluminate used by the above of an amount about 5 times, and making a crystallization reaction perform, the slurry containing an aluminum hydroxide with the content Na concentration (Na<sub>2</sub>O conversion) of 0.1 % of the weight, a particle diameter [ first / an average of / of 3 micrometers ], and a particle diameter [ second / an average of ] of 10 micrometers was obtained. After adding water to this slurry and adjusting concentration to 100 g/l, it supplied to the wet medium mill (KOTOBUKI Research Institute Industries make, a trade name: apex mill AM-1 mold), and ground on condition that the following.

Grinding media: 2mmphi zirconia ball 700ml mill rotational frequency : 1800rpm flow rate : The second [ an average of ] particle diameter after 300 ml/min grinding was 4.3 micrometers, and BET specific surface areas were 3.2m<sup>2</sup> / g. While the super decanter (product made from \*\*\*\*\*) furthermore performed surface grinding for the slurry after grinding, washing and solid liquid separation were performed, and the aluminum hydroxide of 20 % of the weight of water content was obtained (the second [ an average of ] particle diameter of the aluminum hydroxide after surface grinding was 4.2 micrometers, and BET specific surface areas were 4.1m<sup>2</sup> / g). Subsequently, after having supplied the aluminum hydroxide after the above-mentioned surface grinding to the bag of polyethylene, having added 4% of the weight of the stearyl phosphoric ester potassium as a finishing agent to this aluminum hydroxide (dry criteria) to this, mixing enough by human power and carrying out covering processing of the finishing agent on an aluminum hydroxide, it dried about 120 degree-Cx3 hour.

[0032] The aluminum hydroxide (the Sumitomo Chemical [ Co., Ltd. ] make, a trade name: particle aluminum-hydroxide C-301R, 0.25 % of the weight (Na<sub>2</sub>O conversion) of content Na concentration, first [ an average of ] particle diameter of 0.9 micrometers, second [ an average of ] particle diameter of 1.6 micrometers) of example 2 marketing was ground on condition that the following using the jet mill (Seishin Enterprise Make, a trade name: KOJIETTO system alpha).

P nozzle pneumatic pressure: -- 7.6kg/cm<sup>2</sup> G nozzle pneumatic pressure: -- 7.6kg/cm<sup>2</sup> throughput : The second [ an average of ] particle diameter after 200 g/H grinding was 1.1 micrometers, and BET specific surface areas were 4.9m<sup>2</sup> / g. Subsequently, 120g of aluminum hydroxides after grinding was added in 1l. of sodium-aluminate solutions of Na<sub>2</sub>O concentration 125 g/l which is in a saturation state at 40 degrees C, for bottom five days of a temperature up

and maintenance, churning was continued at 60 degrees C and the partial dissolution was performed at them. the obtained slurry -- solid liquid separation -- washing, the water content of 25%, the second [ an average of ] particle diameter of 1.3 micrometers, and a BET specific surface area obtained the aluminum hydroxide of 4.2m<sup>2</sup> / g. Subsequently the obtained aluminum hydroxide performed surface treatment by the same approach as an example 1.

[0033] The raw material aluminum hydroxide obtained by crystallization in example 3 example 1 was filtered and washed, and it dried in 120 degree-Cx 1 hour. Subsequently, bulk crushing of the obtained aluminum hydroxide was carried out on condition that the following using the jet mill (the Seishin Enterprise make, a trade name: KOJIETTO system alpha).

P nozzle pneumatic pressure: -- 5.0kg/cm<sup>2</sup>G nozzle pneumatic pressure: -- 5.0kg/cm<sup>2</sup>

throughput : The second [ an average of ] particle diameter after 200 g/H grinding was 1.7 micrometers, and BET specific surface areas were 4.9m<sup>2</sup> / g. Furthermore, water was added to this grinding aluminum hydroxide, it was made the slurry of 50% of water content, the super decanter performed surface grinding and solid liquid separation, and the aluminum hydroxide of 20% of water content was obtained. This second [ an average of ] particle diameter was 1.6 micrometers, and BET specific surface areas were 9.2m<sup>2</sup> / g. Subsequently the obtained aluminum hydroxide performed surface treatment by the same approach as an example 1.

[0034] (Production of a thermoplastics constituent) the aluminum-hydroxide 150 weight section after the surface preparation obtained by the approach of the above-mentioned examples 1-3, and a polyethylene bead (the Sumitomo Chemical Co., Ltd. make --) Super-low density polyethylene, EKUSEREN VL The 100 weight sections for MFR:0.8g / [ VL100 and ], and 10 minutes It supplies to a lab PURASUTO mill (made in an incorporated company Oriental energy machine factory, form:30-C150, a mixer type: R-100). After mixing, the preheating was performed for 5 minutes at 160 degrees C, with the blade stopped, after preheating termination, similarly, for 10 minutes was rotated at 160 degrees C, the blade was rotated by 60rpm, it kneaded, and the thermoplastics constituent was obtained. the front face of the Plastic solid acquired from the kneading torque at this time and the fluidity (MFR) of the obtained thermoplastics, fire retardancy, and this -- description was investigated. [0035] which shows the result in Table 1 After performing surface treatment for the same Bayer process aluminum hydroxide as it was with having used in the example of comparison 1 example 1 by the same (without it performs grinding processing entirely) approach as an example 1, kneading with resin was performed and the thermoplastics constituent was obtained. the front face of the Plastic solid acquired from the fluidity (MFR) of the obtained thermoplastics, fire retardancy, kneading torque, and this -- description was investigated. [0036] which shows the result in Table 1 surface grinding after grinding according [ on example of comparison 2 example 3, and ] to a jet mill, and by the super decanter -- not carrying out (the second [ an average of ] particle diameter of this thing having been 1.7 micrometers, and BET specific surface areas having been 4.9m<sup>2</sup> / g) -- water was added and the aluminum hydroxide of 20% of water content was obtained. After performing surface treatment for the obtained aluminum hydroxide by the same approach as an example 1, kneading with resin was performed by the same approach as an example 1, and the thermoplastics constituent was obtained. the front face of the Plastic solid acquired from the fluidity (MFR) of the obtained thermoplastics, fire retardancy, kneading torque, and this -- description was investigated. [0037] which shows the result in Table 1

[Table 1]

	MFR g/分	難燃性	混練トルク k g · m	表面性状
実施例 1	0. 5 8	良	4. 7	○
実施例 2	0. 5 9	良	4. 7	○
実施例 2	0. 5 9	良	4. 3	○
比較例 1	0. 4 9	良	5. 1	×
比較例 2	0. 2 8	良	4. 9	×

---

[Translation done.]

This Page is inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ BLACK BORDERS
- ☒ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLORED OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REPERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images problems checked, please do not report the problems to the IFW Image Problem Mailbox**